

SPRING 2025

# MAKE A DIFFERENCE

### INSIDE

Your support is crucial Cancer imaging startup Jackson family unlocks opportunity A special report for supporters of the Morgridge Institute for Research



# BRAD'S UPDATE

our support of the Morgridge Institute for Research and our curiosity-driven work has never been more important than it is today.

You make our mission possible by fueling Morgridge's ability to attract the brightest scientists, equipping them with leading-edge tools, and by allowing us to bring science into the public realm, expanding the understanding of science's role in society.

The evidence of our impact is compelling. The return on your investment is changing the face of biomedical science. For example, Morgridge research is working toward:

- Better early-warning systems to prevent preterm birth, which impact one in 10 pregnancies in the United States and pose serious health threats to newborns;
- New pathways to treat acute long COVID;
- New approaches to fighting schistosomiasis, a tropical disease that sickens more than 200 million people annually and is expanding due to climate change;
- Techniques that may help repair human heart tissue damaged by heart attack.

All of these projects — and many more — are powered by our researchers' curiosity. Sustaining that momentum is key to moving our discoveries forward, changing lives by improving human health.

Our vigor, inspired by your generosity, makes a lasting impact that will be felt for generations as we lift science and society with new discoveries.

Government funding models are shifting, and universities are prioritizing translational research. But to support that translational research, the work of Morgridge scientists is essential. It provides the basic research building blocks and key discoveries that make new therapies possible.

Our researchers are also entrepreneurial, helping to usher scientific knowledge into the marketplace. In this report,



we detail how Morgridge Investigator Kevin Eliceiri is working with startup company Elephas Biosciences, which created a platform to predict whether patients will respond successfully to cancer immunotherapy.

This update also highlights how Sondra Jackson and her family have lent their support to our Summer Science Camp, opening new worlds of science knowledge and university life for rural Wisconsin high school students.

From the lab bench to the marketplace to the community, Morgridge is making a difference, with your support and through your vision.

As always, thank you for your commitment!

Brad Schwartz, M.D.

Carl Gulbrandsen Chair Chief Executive Officer Morgridge Institute for Research

# **THANK YOU**

Your vision and support attract talented researchers who power the Fearless Science that helps improve human health.

> **P.S.** What's on the cover? Students peer into virtual environments during a Morgridge outreach activity.

#### SABINA FARHADOVA

# **Carl & Mary Gulbrandsen Postdoctoral Fellow**

s a young girl in Baku, Azerbaijan, a capital-city metropolis on the shore of the Caspian Sea, Sabina Farhadova's fascination with science sprouted and eventually led her on an international quest to uncover the hidden mechanisms of life.

"My passion for science began at an early age, driven by my curiosity about how life works at the molecular level," says Farhadova, the recently named Gulbrandsen Postdoctoral Fellow at the Morgridge Institute for Research.

Because Baku, also known as the "Paris of the East," is located at at the intersection of many cultures, she was able to study Azerbaijani,

Turkish, Russian, and English. "I had access to books in multiple languages, which allowed me to explore scientific topics beyond my school curriculum," she says.

After earning an undergraduate degree in biology at Baku State University, she went on to earn a master's degree studying molecular genetics and Darwinism — deepening her understanding of genetic diseases — at the Azerbaijan National Academy of Sciences.

During her master's work, Farhadova joined a small research team which secured a grant to study genetic mutations in beta thalassemia in the Azerbaijani population.

"It gave me my first experience in real-world scientific research," Farhadova says. "This success, along with my mentor's encouragement, convinced me that I wanted to pursue a research career in molecular biology and genetics."

Farhadova was one of just two candidates chosen from Azerbaijan to enter a prestigious doctoral program jointly run by the Azerbaijan National Academy of Sciences and France's University of Montpelier.

"In the U.S., we often take for granted the opportunities available for education and research," she says. "Coming from Azerbaijan, I have had to fight for every opportunity in these areas."

Her fight and persistence paid off.

For Research U

As a doctoral student, she focused on genomic imprinting and epigenetic regulation, with an emphasis on how imprinted genes contribute to development and disease. Her research used CRISPR-based technologies and stem cell models to uncover new insights into imprinting disorders.

"Each step, whether securing grants, pursuing a PhD in France, or moving to the United States for postdoctoral research, was driven by my curiosity, perseverance, and belief that my work can make a difference," Farhadova says.

At Morgridge, she will work with investigators Melissa Skala and Darcie Moore to use cuttingedge imaging technologies to answer fundamental questions about neurogenesis — the process by which new neurons are generated in the brain and stem cell biology.

Morgridge's Fearless Science approach also resonates with Farhadova, because it fosters a culture of bold, interdisciplinary research that pushes scientific boundaries.

"The emphasis on collaboration, innovation and risk-taking creates an environment in which scientists can explore groundbreaking ideas without the constraints often found in traditional research settings," she says.



Farhadova plans to eventually parlay her scientific experiences into a career in private-sector biomedical research.

"While I enjoy working in academia, I am drawn to the fast-paced, impact-driven environment of the private sector, where research can quickly lead to real-world applications," she says.

For prospective doctoral candidates, she offers this advice: "Embrace challenges and actively seek mentorship. Most importantly, enjoy the process of discovery and never be afraid to ask bold questions — that's where the true innovation happens."

Farhadova's plate is full, as she juggles science while settling into Madison with a newborn son, Murad, and her husband Khagani Eynullazada, a PhD student at the Wisconsin Institute for Discovery. She credits her husband and Moore for providing incredible support and guidance as she balances her work and personal lives.

"I rely on structured planning to manage my time efficiently, ensuring that I dedicate guality moments to research, family, and selfimprovement," she says. "The balance is incredibly rewarding, as both my family and work life bring me fulfillment and purpose."

### **THANK YOU**

Your support ensures that gifted, determined researchers can grow their careers, using their skills to improve human health.



# **New cancer imaging** startup company harnesses **Wisconsin expertise**

n adult elephant has the body mass of about 100 human beings. Despite their enormous size, these remarkable creatures defy the odds by almost never getting cancer.

This mysterious paradox is a source of inspiration for a promising new Wisconsin spinoff company, Elephas Biosciences, which created a platform to predict whether patients will respond successfully to cancer immunotherapy.

Elephas was born in 2020 with major influences from bioimaging advances at the University of Wisconsin-Madison and the Morgridge Institute for Research. Morgridge Investigator Kevin Eliceiri a UW-Madison professor of medical physics and biomedical engineering, has been working closely with Elephas leaders to help bring this promising new technology to fruition.

Immunotherapy treatments — essentially powering the body's own immune system to fight cancer — are the newest wave of cancer treatment and are generating great hope. More than 70 immunotherapy drugs are now in the clinical pipeline with more than 1,000 clinical trials nationally.

The National Cancer Institute estimates that about 20 percent of all immunotherapy treatments result in fully treating cancer. That means many people can go through months of treatment before they know whether it will work. The uncertainty also means that some patients who might be ideal candidates for immunotherapy do not get recruited.

Elephas is working to change that dynamic by testing drugs within "tumors in a dish" from a patients' own biopsy and predicting which

candidates will have the best odds of success. A key aspect of this testing is using label-free, non-invasive imaging modalities that can help determine cell state and viability without adverse effects on downstream drug testing.

"The problem is we're spending hundreds of millions of dollars on these great therapies, but there are no tools to guide decisions on who will benefit most," says Maneesh Arora, founder and CEO of Elephas. "And with all these immunotherapies coming to market, that is the big opportunity for Elephas."

The company completed some major milestones in 2024, including:

- A clinical partnership with Mayo Clinic in Rochester, Minn. This will allow a long-term study of whether patients' clinical responses to immunotherapies match the predictions that were created by the Elephas platform.
- A big infusion of investment capital. Elephas received \$55 million in its most recent round of capitalization in December 2023 led by the Venture Investors Health Fund and the State of Wisconsin Investment Board.
- Employee growth. Elephas now has more than 90 employees on Madison's near west side and has ramped up its testing through relationships with 13 different clinical sites across the country. It is receiving up to a dozen live biopsies a week for testing.

The technology behind Elephas uses live biopsy tissue to preserve the complex tumor microenvironment in which cancer grows. This enables clinicians to look at how the variety of different cells — tumor cells, noncancerous cells, and immune cells — coordinate to either promote or suppress tumor growth. And they can measure the natural contrast generated by cell metabolism to determine how the microenvironment is responding to different drugs.



**KEVIN ELICEIRI** 

"If we can tell clinicians in 72 hours what actually will happen (during treatment) three to six months later, that will be an incredibly pivotal moment and the single goal of everyone at our company," Arora says. "It's proving the platform can predict response to immunotherapy from a live tumor biopsy."

Eliceiri says the Elephas story is a great example of how UW–Madison scientists and companies work together. Ideas flowed through numerous informal discussions, and different expertise was tapped as questions arose. New collaborations are being explored, including with Morgridge biomedical engineering PI Melissa Skala.

"Having that direct interaction between companies and professors without layers is really important," Eliceiri says.

MANEESH ARORA

Elephas is part of Madison's growing biotechnology startup company culture and is a direct beneficiary of the successful paths paved by others. One example is Third Wave Technologies, a company that celebrated the 30th anniversary of its founding in December 2024.

In the early 2000s, Arora was an executive of Third Wave, a molecular diagnostics company that developed products for cervical cancer screening. That technology emerged from the labs of UW– Madison biomolecular chemistry professor James Dahlberg (a member of the Morgridge Board of Trustees) and chemistry professor Lloyd Smith. Third Wave was purchased in 2008 by Hologic Inc. for roughly \$600 million.

Third Wave produced another major success story. Its former CEO Kevin Conroy is now CEO of Exact Sciences, one of the biggest household-name biotech companies in Wisconsin that specializes in tools for the early cancer detection.

And Third Wave was the Wisconsin Alumni Research Foundation's very first foray into taking equity stake in a company, something it does commonly today (and has done so with Elephas). That full-circle impact is on full display today.

## **THANK YOU**

Your support helps creative minds forge partnerships and translate research into life-changing therapies to improve lives.

# **77**

**THIRD WAVE RAISED UNPRECEDENTED AMOUNTS OF VENTURE CAPITAL FOR THE TIMES AND PLAYED A SIGNIFICANT ROLE** IN THE GROWTH OF **VENTURE CAPITAL AVAILABILITY IN** WISCONSIN," SAYS **JENNI LE, PRINCIPAL OF VENTURE INVESTORS HEALTH FUND. "THEY WERE** THE FIRST BIOTECH **COMPANY TO GO PUBLIC IN MADISON**, FOREVER ALTERING THE PERCEPTION OF **MADISON AS A PLACE TO WORK AND START** A COMPANY.





#### **DONOR PROFILE**

# Jackson family's investment helps rural students broaden horizons

ell before Sondra Jackson went on to work as a software engineer in the space shuttle program, and before her late husband Ed Jackson became chair of UW– Madison's Department of Medical Physics, they met as first graders in a rural Alabama school.

Together, they went through school, harboring interests in science and math. The two started dating in high school and together they enrolled in Auburn University. Sondra, whose high school didn't offer calculus, recalls their first day of introductory calculus at Auburn.

"We sat down that first day and the professor put something on the board and said, 'If you don't know what this is, you're probably in the wrong class," she says. "We didn't have a clue, but we made it through anyway. But it was not easy." The lack of resources and meaningful connections between universities and rural public-school districts stuck with the Jacksons – who later became financial supporters of Morgridge's Summer Science Camp.

The couple wanted to help inspire scientific discovery in students from Wisconsin's rural schools and introduce them to university life — which often seems intimidating to students from rural backgrounds.

"Even though this university is not at your doorstep, that doesn't mean that it's not accessible or not right for you," Sondra says. "As you're looking around for what to do with the rest of your life, look further and don't be intimidated. That's the message the Summer Science Camp can deliver."

Last year, the 18th annual camp welcomed 75 high school students from 13 rural high schools

across Wisconsin to participate in hands-on science activities alongside researchers. For the past several years, the Jacksons' support has been recognized by naming a week of camp after Ed.

In addition to giving students a chance to learn about the depth and breadth of career opportunities in science and engineering, the camp provides an opportunity to live on campus and sample university life and meet with UW-Madison admission and financial aid advisors.

"We realized that it would have been much easier during our college careers if we would have had more connection earlier to higher education and what it offers. That's why supporting the Summer Science Camp appealed to us," Sondra says.

After they graduated from Auburn, Sondra went on to work for 10 years as a software engineer for IBM, which contracted with NASA on the space shuttle program.

Ed stayed at Auburn to receive a master's in physics prior to marrying Sondra in 1986. He then earned a doctorate in biophysics from the University of Texas Health Science Center at Houston's Graduate School of Biomedical Sciences.

An expert in magnetic resonance imaging and its use in treating cancer, Ed spent 20 years working at Houston's MD Anderson Cancer Center. In 2013, he and Sondra came to UW–Madison, where Ed served as chair of the Department of Medical Physics.

Along the way, the couple had two children, Michelle and Jonathan. Michelle, with a master's in psychology, is a business analyst for a health care IT firm and Jonathan is a postdoctoral fellow in biophysics at a Max Planck Institute in Germany.

In 2019, Ed died of cancer at age 58 and the family decided to continue their support of the Summer Science Camp.

"As we were getting everything in order, we talked about it and knew that's what Ed would've wanted to do," Sondra says. "We always had it in mind to open doors for rural kids and make them think, 'Hey, I can do this."

### **THANK YOU**

For helping the next generation discover the promise of science and tap their full potential.

#### **MORGRIDGE RESEARCH NEWS**

# Thomson Lab innovations hold promise for vascular surgery, eye disease

Researchers from Morgridge's Thomson Lab and the Wisconsin National Primate Research Center (WNPRC) continue to pioneer new techniques in regenerative biology.

In a study in *Cell Reports Medicine*, the researchers described creation of a universal, small-diameter, vascular graft using stem cellderived arterial endothelial cells that could advance the field of vascular bypass surgery.

"Although synthetic vascular grafts have been successfully used in clinics for large vessel repair, sources for small-diameter vessels, most commonly used for the coronary bypass surgery, are limited," says senior co-author Igor Slukvin, UW–Madison professor of pathology and laboratory medicine at WNPRC. "This work is an important step in advancing stem cell technologies for bioengineering vascular grafts."

Currently, the only clinically approved option for small-diameter vascular bypass grafts involves taking a blood vessel from another part of the patient's body, which is invasive and limited by which vessels can be used. Vessels from donors can lead to rejection.

"Patient-specific cell therapies can be cost prohibitive and time consuming. We wanted to develop a 'off-the-shelf' small-diameter arterial graft that can be readily used in clinical settings," says senior co-author John Maufort, an associate scientist formerly in the Thomson Lab.

In another 2025 study, Morgridge and UW–Madison researchers developed a way to create lab-grown

retinal organoids from pigs, an advance that could contribute to future eye treatments for humans.

"This is the first time that people have made pig retinal organoids," says Kim Edwards, a graduate student and first author of the new study in *Stem Cell Reports*.

Edwards did her research in the laboratory of David Gamm, director of UW–Madison's McPherson Eye Research Institute and professor of ophthalmology and visual sciences.

Organoids are small tissue clusters which allow scientists to replicate the cellular interactions and conditions in a human tissue or organ, but in a lab. Researchers found that pig-derived photoreceptors shared many similarities with those made from human retinal organoids.

By testing "human-equivalent" photoreceptors in pigs, researchers can better understand cell behavior without immediate host rejection, according to Gamm.

They collaborated with University of Calgary assistant professor Li-Fang "Jack" Chu, formerly a postdoc in Jamie Thomson's Morgridge lab, to obtain the pig pluripotent stem cells.

"Historically, the Thomson Lab has been good at making human induced pluripotent stem cells," says Ron Stewart, Morgridge investigator in computational biology. "It turns out that making them for additional species like a pig is really challenging. Jack worked it out and is leading the way."

### **THANK YOU**

For support that magnifies our impact on research well beyond our walls.



# Morgridge **Milestones**





#### Schwartz named AAAS Fellow

Brad Schwartz, Morgridge CEO and UW-Madison professor of biomolecular chemistry, was elected as a fellow of the American Association for the Advancement of Science, the world's largest general scientific society.

Schwartz was one of eight UW-Madison scholars, and more than 500 nationally, elected to the 2024 class. The honor recognizes efforts to advance science and society, with fellows chosen to reflect the highest standards of scientific integrity and professional ethics.

Schwartz was elected for distinguished contributions to the field of hematology, in particular in treating disorders of protease cascades, and for outstanding leadership and administrative services, including initiatives to increase diversity.



#### **Bioimaging experts gather in** Madison to share expertise

Biolmaging North America, co-chaired by Morgridge Investigator Kevin Eliceiri, attracted experts from around the globe to the UW-Madison campus for its 2024 Community Congress.

The group, headquartered at Morgridge, brought together bioimaging experts in a fiveday conference under the theme of building community, tools, and expertise in the field. In addition to lecture and talks, participants toured campus facilities.

Imaging is a perennial bedrock of scientific advancement. Offering the ability to visualize cellular and molecular life, imaging drives breakthroughs and innovation across the many fields of science.



#### **Morgridge Trustee James** Dahlberg honored for entrepreneurial achievement

James Dahlberg, Morgridge trustee and former interim chief executive officer, was among three outstanding innovators to receive 2024 Chancellor's Entrepreneurial Achievement Awards.

The awards recognize individuals with UW-Madison ties who have contributed to economic growth and social good, served as entrepreneurial models for the UW community, and inspired the campus culture of entrepreneurship.

Dahlberg fused academics with entrepreneurship, translating basic research into technologies for leading startups. After joining UW-Madison's School of Medicine and Public Health in 1969, his research on DNA and RNA led to multiple patents through the Wisconsin Alumni Research Foundation.

Dahlberg co-founded Cambridge BioTech Corp., and in 1993, he co-founded Third Wave Technologies, which later went public and was sold. Its intellectual property was licensed by Exact Sciences, a leading cancer screening and diagnostics company.

### UW, Morgridge welcome new **Rita Allen Civic Science Fellows**

The Rita Allen Civic Science Fellows Program aims to engage with diverse individuals to support a culture of civic science.

"The Morgridge mission of 'inspiring scientific curiosity in everyday life' resonated with me; I hope my work can contribute to that goal," says Strydhorst, who received her doctorate at Texas Tech University.

Choi earned a PhD at the University of Michigan.

"I would love to develop an agenda on communityengaged research approaches to understand realworld implications and barriers of communication strategies that aim to increase public engagement with science and environmental issues," she says.



Soobin Choi and Natasha Strydhorst were chosen as the 2024 Rita Allen Civic Science Fellows, helping bridge the disconnect in public discourse surrounding science topics.

"We're doing something new and exciting in this new joint effort by Morgridge and the Rita Allen Foundation," says Morgridge Investigator Dietram Scheufele, of the Science Communication Incubator Lab. "The fellows will work on exploring new pathways for more constructive societal debates about emerging biomedical science."

**MORGRIDGE, UW-MADISON PARTNERSHIPS** 

# Putting Science in the Hands of School Kids

## **THANK YOU**

Your vision helps schoolchildren gain a firm footing in STEM education, paving the way for greater scientific understanding and for the next generation of pioneering scientists. collaboration between the Morgridge Institute for Research and partners scattered across the UW–Madison campus is unlocking new, tailored sciencelearning opportunities for thousands of Wisconsin schoolchildren.

The partnership between science outreach offices streamlines the way K-12 field trips are scheduled and conducted, ensuring that teachers and students make the highest, most productive use of their time on campus to learn STEM concepts.

"We want to make it easy for the students and teachers to make it to campus," says Wes Marner, Morgridge's engagement, education, and equity director. "We've brought it together as a cohesive set of STEM field trips, working together across campus to serve teacher and student needs, instead of having a whole lot of pop-up silos doing it on their own."

In its pilot year, the collaboration brought about 3,600 students to campus, and that number is expected to grow to at least 5,000 a year.

In the past, K-12 classes might schedule a separate field trip to the Geology Museum and possibly try to set up another venue. But in the new, coordinated system, they can be more intentional and make their time on campus more fulfilling by conveniently arranging a whole day of activity.



Val Blair, Morgridge senior community engagement coordinator, says science outreach staffers work together to set up customized field trip itineraries.

"We want to maximize the amount of STEM exploration they get in one day on campus," Blair says. "We know transportation costs are high, so we want to make sure they get a great day filled with the experiences that their teachers feel will satisfy their curriculum."

Julie Traxler, who teaches second graders at Madison's Dr. Virginia Henderson Elementary

Continued on page 17.



#### INAUGURAL POSTDOC EXPO

The first Wisconsin Postdoc Expo was held in November and was co-produced by Morgridge, UW–Madison Office of Postdoctoral Studies, Medical College of Wisconsin, and Versiti Blood Research Institute. The one-day virtual event garnered 400 registrants, including 220 who submitted resumes for future hiring consideration.



### 21 UW-MADISON STUDENT ORGANIZATION **PARTNERSHIPS**

## 85 INDIVIDUAL PROFESSIONAL **AND CAREER ADVISING SESSIONS**

provided by Program Manager Ellen Dobson for 47 Morgridge employees.

### **368** STUDENTS PARTICIPATING **IN AFTERSCHOOL EXPEDITIONS**

where Morgridge outreach staff bring educational programs to nearby communities.

# 5 MORGRIDGE PROFESSIONAL DEVELOPMENT EVENTS

These professional development seminars were open to campus participants, generating 487 registrations and 169 attendees from UW-Madison.

# **7** UW-MADISON COLLEGES &

# **22** DEPARTMENTS PARTICIPATED IN **MORGRIDGE PROGRAMS**



and add on the fossil excavation, which I'd never heard of. I love going to one spot and finding all the available science trips," she says.

The collaboration involves 11 science-related campus sites, including Morgridge, Chamberlin Hall's Physics Museum, the Wisconsin Energy Institute, BioTrek in the Biotechnology Building, and others.



with many field trip opportunities

booked through the spring. It is also strengthening relationships with teachers.

"If you can get yourself here," Jesse says, "we can move you around campus and get you into a lot of hands-on, relevant experiences for free. And even the ones that charge are pretty low cost."

In addition to helping enrich the student experience, the system also allows organizers to prioritize schools with the greatest number of students of economic need, with Morgridge able to defray transportation costs in some cases.



visit and send them to rotate in smaller groups to multiple campus venues at once."

The program's success has also influenced other community engagement programs, such as summer camps, Blair says.

"When we're bringing a lot of kids on campus during the summer, we use the same field trip process and had them moving around campus and exploring a lot of different things," she says.

Marner says the partnership has broadened the impact that Morgridge, working closely with other campus units, can have with K-12 students.

#### WES MARNER

"It's awesome that this group has come together so that the teachers from around the state can go to one spot and get things organized in a way that works for them. Community engagement is one of the spaces where a little bit of organization and a relatively small amount of funding can make a huge difference."

WES MARNER, DIRECTOR OF ENGAGEMENT, EDUCATION AND EQUITY





THE DISCOVERY BUILDING 330 N. ORCHARD STREET, MADISON WI 53715 608.316.4100 / MORGRIDGE.ORG